1

THE YOUNG AND THE OLD

Rapid demographic change is being observed across the EBRD regions. Turkey and the economies of the southern and eastern Mediterranean and Central Asia currently find themselves at an early stage of their demographic transition.

To create high-quality jobs for their many new entrants to the labour market, these economies need to boost levels of physical capital per worker and improve human capital. Meanwhile, in emerging Europe, populations are ageing fast.

In advanced economies, immigration, automation and longer working lives have so far mitigated the economic impact of ageing. In emerging Europe, pension reforms and adjustments to tax systems can help to encourage older people to seek employment, while improvements in healthcare and lifelong learning opportunities are important in order to help older employees to retain and upgrade their skills.

Introduction

Thomas Malthus sounded the alarm about demographic pressures on economic well-being more than two centuries ago.[1] However, contrary to his prediction, the planet has not run out of the resources required to sustain population growth.[2] As population density has risen, improvements in technology and human capital have helped to boost productivity in agriculture, construction, public utilities and transport. Meanwhile, the focus of public debate has gradually shifted to the interplay between demography, technology, education and employment.

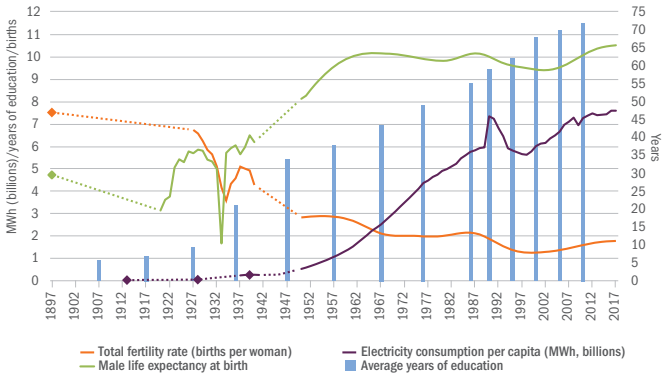
Demographic transformations can occur fast, with profound effects on the functioning of economies.[3] A century ago, life expectancy in the United States of America (USA) was around 40 years. Today, it is almost double that figure. In the Russian Empire on the eve of the 1917 revolution, life expectancy was around 31 years. By 1994, life expectancy in Russia was 66 years. And today, it is around 72. Russia's total fertility rate (the number of births per woman) is estimated to have fallen from around 7.5 a century ago to about 1.4 in the mid-1990s, before rising to around 1.8 today (see Chart 1.1).

Demographic shifts both reflect and catalyse changes in education and technology. As life expectancy in Russia has risen from 31 years to 72 years, people's ability to accumulate skills has changed dramatically, as have the prospects of achieving a financial return on those skills. Indeed, average years of education have risen rapidly as life expectancy has improved and the total fertility rate has declined. At the same time, technological change (such as the advent of electricity and computing; see Chart 1.1) has further increased demand for basic cognitive and computing skills, while also contributing to better standards of healthcare and further improvements in life expectancy.

The demographic changes that are being observed in emerging markets today are similarly fast-paced, as documented in the Macroeconomic Overview. Before the financial crisis of 2008-09, countries where labour force growth outpaced population growth accounted for 90 per cent of emerging market economies' contributions to GDP. By 2040, labour force growth is expected to exceed population growth in only 20 per cent of the world's emerging markets. This means that a given rate of productivity growth will translate into a lower rate of per capita income growth.

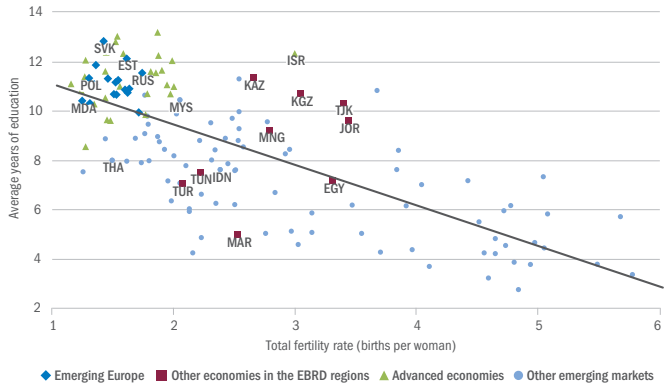
This chapter looks at how rapid demographic change influences countries' development paths, examining the impact of trends in demographics, technology, migration and the accumulation of skills. On the basis of that analysis, this chapter highlights policies that can help to deal with demographic challenges, looking at how countries in emerging Europe can improve labour force participation rates and enhance the productivity of older workers, and looking at how Turkey, Azerbaijan and the economies of Central Asia and the southern and eastern Mediterranean (SEMED) can create jobs for their young people.

CHART 1.1. Demographics, education and technology have evolved in tandem in Russia



Source: UN, Andreev et al. (1998), Kurkin (1938), Mironov (1991), Barro and Lee (2013), eeseaec.org and authors' calculations.

CHART 1.2. Average years of education increase as the total fertility rate declines



Source: Barro and Lee (2013), UN and authors' calculations.

[1] See Malthus (1798).
[2] See Lam (2011).
[3] See Lee (2003).

The chapter starts by looking at the demographic dividends that countries can secure as their birth rates fall and their life expectancy rises. These dividends manifest themselves in a higher ratio of workers to non-workers, higher levels of savings and greater investment in human capital. Over time, however, such dividends may be reversed and turn into demographic headwinds. The chapter then looks specifically at the economies in the EBRD regions that are in the early stages of that demographic transformation process – Turkey, Azerbaijan and the countries of Central Asia and the SEMED region – before turning its attention to the countries of emerging Europe, which are battling the headwinds of population ageing.

As we shall see, responses to population ageing may involve a combination of immigration, automation and longer working lives. This chapter looks at how countries can help people to stay productive for longer, exploring the ways in which pension and tax systems encourage people to remain in employment and assessing the factors that enable people to enjoy longer working lives (such as better health and lifelong learning). Chapter 2 then examines the subject of automation, and Chapters 3 and 4 look more closely at cross-border and internal migration.

THE CEB REGION IS ONLY ABOUT

5 YEARS

BEHIND THE ADVANCED ECONOMIES OF THE EU IN TERMS OF POPULATION AGEING

THE WORKING-AGE POPULATION OF CENTRAL AND SOUTH-EASTERN EUROPE IS EXPECTED TO SHRINK BY

17%

BY 2040

Demographic dividends can turn into a demographic burden

The first demographic dividend: a growing labour force and lower dependency ratios

As low-income countries develop, they have the opportunity to reap what is termed the "first demographic dividend".[4] As incomes rise, life expectancy improves and the birth rate tends to fall. In the early stages of economic development, this results in the working-age population growing much faster than the number of young and old people.

In addition, labour force participation among women tends to increase as the birth rate declines, although trends vary in accordance with prevailing social norms and skill requirements in the workforce.[5] Relatively strong labour force growth, in turn, raises the growth rate of per capita income (income convergence) for any given rate of output per worker, as discussed in the Macroeconomic Overview.

The second demographic dividend: accumulation of savings and human capital

As improvements in the standard of living and healthcare gradually translate into rising life expectancy, individuals, firms and governments start to save more in anticipation of the need to finance future retirement. A higher savings rate enables an economy to sustain higher investment rates without exposure to risks associated with high and persistent current account deficits (the difference between domestic savings and investment). Higher levels of investment lead to increases in the stock of physical capital per worker, which in turn boost labour productivity and increase the speed at which per capita incomes converge with the income levels seen in advanced economies.[6]

In addition, increases in life expectancy raise lifelong returns to education, while lower fertility rates enable both parents and the state to commit more resources to each student. Thus, a decline in the number of children leads to an increase in quality.[7] As a result, the accumulation of human capital accelerates, providing a further boost to productivity growth. This is reflected in the strong relationship between higher average years of education and lower birth rates (see Chart 1.2). Increases in savings and spending on human capital in response to demographic change are referred to as the "second demographic dividend". The increased spending on human capital may be of particular importance as the empirical relationship between demographic variables and aggregate savings in the economy tends to be weaker.

Demographic dividends reversed

As economies develop, demographic dividends can turn into a demographic burden. If life expectancy continues to rise, and the birth rate continues to fall, a country's population will age. Fewer workers will enter the labour force, while more workers will enter retirement. The ratio of the labour force to the total population will start to decline again, owing to a rising old-age dependency ratio (the number of people aged 65 or over as a percentage of the number of people aged between 15 and 64). Thus, the first demographic dividend will be reversed.

[4] The term "demographic dividend" was coined by Bloom et al. (2003) in a paper based on earlier work by Bloom and Williamson (1998) on the "demographic gift".
[5] See Mammen and Paxson (2000) and Goldin (2006).
[6] See, for instance, Young (1992) and EBRD (2017).
[7] See Becker and Lewis (1973).

A rise in accumulated pension obligations will necessitate increases in taxation and public debt. For instance, the labour tax wedge (the difference between gross salary and take-home pay) tends to rise as the old-age dependency ratio increases.[8] Pensioners may then start selling their assets (whether held privately or by pension funds on pensioners' behalf). If this happens on a significant scale, that dissaving can lead to a rise in long-term interest rates.[9]

In addition, as the age of the median worker rises, the total stock of human capital may start to depreciate, at least when it comes to basic cognitive skills or physical abilities that are harder to retain with age.[10] As a result, the second demographic dividend may also become a burden, typically after the first demographic dividend has been exhausted.

Agenda for young economies

Most developing economies still have relatively young populations. In these economies, there is significant scope to benefit from the first and second demographic dividends in the coming years.[11] In the EBRD regions, Azerbaijan, Turkey and the economies of Central Asia and the SEMED region are all at this early stage of the demographic transformation process.

The large numbers of young people in the populations of such economies are sometimes referred to as the "youth bulge", owing to the shape of the resulting demographic "tree" (see Chart 1.3). The demographic trees of those economies contrast sharply with those of the rapidly ageing economies elsewhere in the EBRD regions (referred to hereinafter as "emerging Europe").

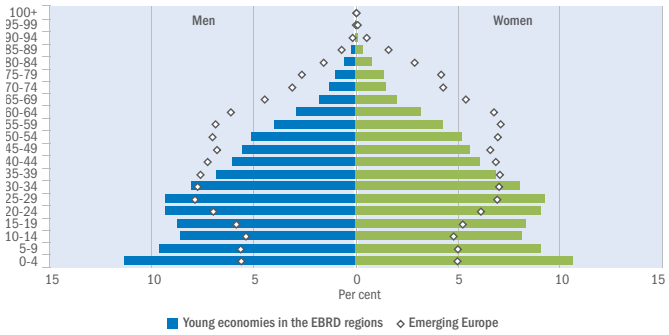
The demographic challenges faced by these economies are shared by many developing economies all over the world, from southern Asia to South Africa, that need to keep creating jobs for their many new entrants to the labour market. In Egypt, for instance, the number of jobs needs to grow by around 2 per cent every year (roughly 750,000 jobs), in order for the economy to be able to absorb all new labour market entrants.

Boosting physical and human capital

As young economies are yet to reap the second demographic dividend, they tend to have lower levels of human capital (see Chart 1.2). Levels of physical capital per person of working age also tend to be lower in young economies (see Chart 1.4), although there is significant variation across countries (and it should be noted that country-wide levels of physical capital are measured much less precisely than labour force participation rates and years of education).

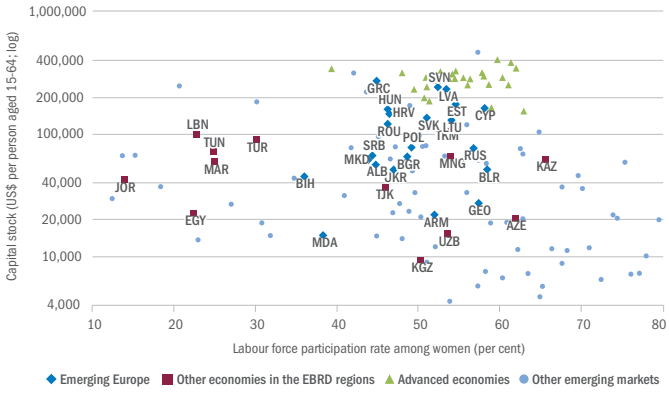
Labour force participation among women is particularly low in the SEMED region and Turkey (see Chart 1.4). Indeed, it averages 34 per cent across the SEMED region, Central Asia and Turkey, compared with 52 per cent in emerging Europe and 53 per cent in the G7 (which comprises Canada, France, Germany, Italy, Japan, the United Kingdom and the USA). Boosting investment, the quality of human capital and women's labour force participation can all help to strengthen per capita income growth in young economies.

CHART 1.3. The youth bulge: Azerbaijan, Turkey and the economies of Central Asia and the SEMED region have much younger populations than emerging Europe



Source: UN and authors' calculations.
Note: Based on data for 2017 or the latest year available.

CHART 1.4. Young economies tend to have lower levels of physical capital and lower labour force participation rates among women



Source: Penn World Tables, ILO, UN and authors' calculations.

THE AVERAGE LABOUR FORCE PARTICIPATION RATE AMONG PEOPLE AGED 50-64 IS

60%

IN THE EBRD REGIONS, COMPARED WITH 74% IN THE G7

[8] See World Bank (2014).
[9] See Goodhart and Pradhan (2017).
[10] See Desjardins and Warnke (2012).
[11] See World Bank (2015a).

Leveraging global savings

In the past, the ability to raise levels of domestic investment in physical and human capital was largely dependent on the generation of domestic savings. Today, these young economies are better positioned to tap the increasingly global pool of savings (rather than relying solely on the increase in savings brought about by the second demographic dividend), with foreign savers playing an increasingly important role as investors in global equity, bond and property markets. The fact that savers around the world are searching for yield is reflected in the synchronisation of equity and debt performance across all markets. Indeed, the current rate of market synchronisation is the highest in 130 years, with levels of correlation ranging between 0.4 and 0.8, up from around 0.2 between the 1950s and the late 1990s.[12]

At the same time, a strong macroeconomic policy framework and a favourable and stable investment climate are required in order to leverage global savings and manage the current account imbalances that are associated with investment persistently exceeding domestic savings. Turkey is a good example of a young economy with persistent current account deficits.

Boosting investment and the quality of human capital also involves strengthening economic and political institutions and improving the business environment. Lowering barriers to the entry and exit of firms and improving the quality of management can help young economies to develop those export industries in which young and growing populations can provide a strong comparative advantage.

Looking ahead

This chapter looks primarily at the new challenges being faced by the rapidly ageing countries in emerging Europe, but its findings apply more broadly. As indicated above, demographic changes can occur fast. Other countries in the EBRD regions (such as Turkey) may soon face the challenges posed by ageing populations and rising old-age dependency ratios. Indeed, Turkey's old-age dependency ratio is projected to rise from around 12 per cent today to 25 per cent in 2040.

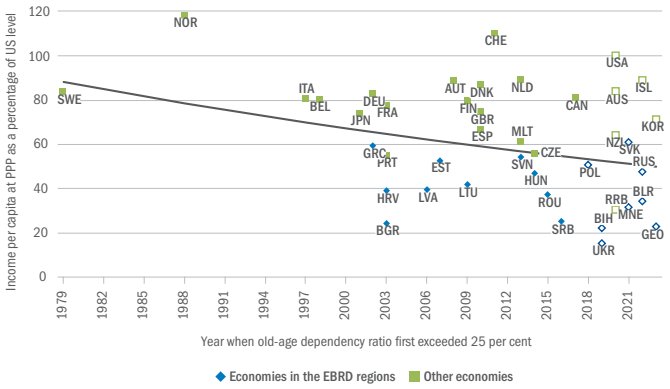
A striking example of the speed of demographic shifts can be found in China. In an attempt to control its rapid population growth, China introduced a one-child policy in 1979. In 2016, however, China's labour force started shrinking. The country's old-age dependency ratio remains below 15 per cent for the time being, but it is projected to rise fast, reaching 30 per cent by 2035 according to UN World Population Prospects estimates.

BY 2040, EMERGING EUROPE WILL HAVE ONE RETIREMENT-AGE ADULT FOR EVERY

TWO

WORKING-AGE ADULTS

CHART 1.5. Countries' old-age dependency ratios are reaching the 25 per cent mark with ever lower per capita income levels relative to the USA



Source: IMF, UN and authors' calculations.
Note: The old-age dependency ratio is the number of people aged 65 or over as a percentage of the number of people aged between 15 and 64.

Emerging Europe: getting old before getting rich

Countries encountering population ageing ever earlier

Until the early 2000s, rapid population ageing was, by and large, something that only affected a small group of advanced economies. Today, however, countries are tending to face such problems at earlier stages of economic development (see Chart 1.5). When in Sweden, Norway and Germany the old-age dependency ratio passed the 25 per cent mark between the late 1970s and the early 2000s, their per capita incomes were roughly equivalent to that of the USA. In central Europe and the Baltic states (CEB), the 25 per cent mark was passed in the mid-2000s with per capita incomes averaging around 45 per cent of the US equivalent. Romania and Serbia reached 25 per cent in 2015-16 with per capita incomes averaging around 30 per cent of the US level. And Ukraine is set to reach that threshold before 2020, with its per capita income projected to remain below 20 per cent of the US equivalent.

Thus, many middle-income economies are at risk of growing old before they can grow rich. The challenges that this poses extend well beyond "mechanical" demographic headwinds to per capita income growth. The necessary adaptation of the economy – in terms of facilitating longer working lives, leveraging technological progress, fine-tuning migration policies and redesigning social safety nets – may well be more challenging in countries with less developed economic and political institutions and less mature market structures. This may be a particular concern for economies in the EBRD regions where governance tends to be weaker than the levels that could be expected based on countries' per capita incomes.[13]

The demographic transformation process, which manifests itself in falling birth rates and ageing populations, is much more advanced in emerging Europe than it is in emerging Asia, Latin

[12] See Jordà et al. (2018).

[13] See IDB et al. (2018).

America, the Middle East or Africa. Many countries in emerging Europe reaped demographic dividends relatively early in the 20th century, similar to advanced economies. Following the start of the deregulation and liberalisation reforms in the early 1990s, the birth rates of post-communist countries fell further, from what were already relatively low levels, reflecting economic hardship and increased uncertainty. In some countries this effect was transitory, rather than permanent, with people delaying having children during the early years of the transition process.[14] While the availability of subsidised high-quality childcare can have a positive impact on both fertility rates and labour force participation among women,[15] it is unlikely to reverse the long-term decline in the number of births in higher-income economies, which reflects changes in the preferred number of children.[16]

In fact, the demographic profile in emerging Europe is similar to that seen in western Europe, with those countries' populations ageing at approximately the same rate as the populations of advanced European economies (see Chart 1.6) on account of modest birth rates and continued improvements in life expectancy.

Ageing-wise, emerging Europe is only 5-10 years behind Europe's advanced economies

In terms of the level of old-age dependency, the CEB region is, on average, only about five years behind the advanced economies of the EU (and a quarter of a century ahead of China). Indeed, the region's old-age dependency ratio and the speed of its increase are actually higher than the US equivalents (albeit much lower than the figures for Japan). South-eastern Europe (SEE), in turn, is only around 10 years behind central Europe in terms of population ageing. In fact, Thailand is the only major emerging market where population ageing is as far advanced as it is in emerging Europe.

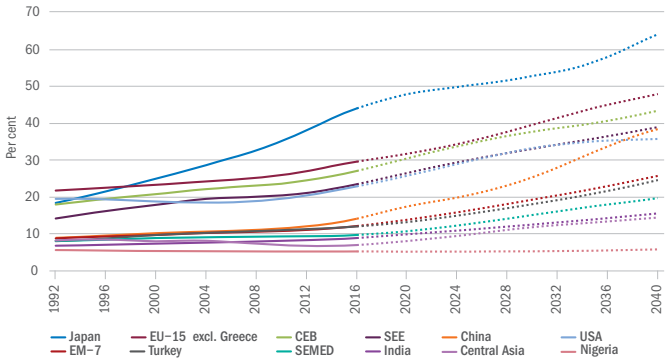
Moreover, on the basis of current trends, the working-age population of central and south-eastern Europe is expected to shrink by 17 per cent by 2040 (see Chart 1.7), with broadly similar developments forecast in eastern Europe. At the same time, however, those depopulation trends are expected to differ significantly from country to country, with implications for productivity and welfare, as discussed in Chapter 4.

Response to ageing: migration, automation and longer working lives

In many countries, migration has mitigated the impact of ageing

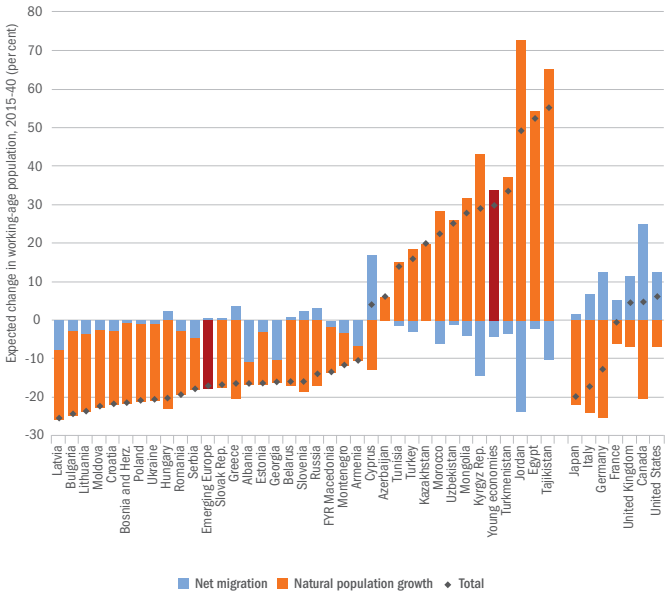
Historically, the link between demographic headwinds and growth in per capita incomes has been relatively weak – so much so that a recent World Bank report referred to Europe's past and potential future experience as "golden ageing" – although there are increasing concerns about the sustainability of generous pension systems in rapidly ageing economies.[17] In advanced economies, the economic impact of ageing has so far been partially mitigated by immigration, automation and longer working lives.

CHART 1.6. Old-age dependency ratios



Source: UN and authors' calculations.
Note: The old-age dependency ratio is the number of people aged 65 or over as a percentage of the number of people aged between 15 and 64. "EM-7" comprises Argentina, Brazil, Indonesia, Mexico, Saudi Arabia, South Africa and South Korea.

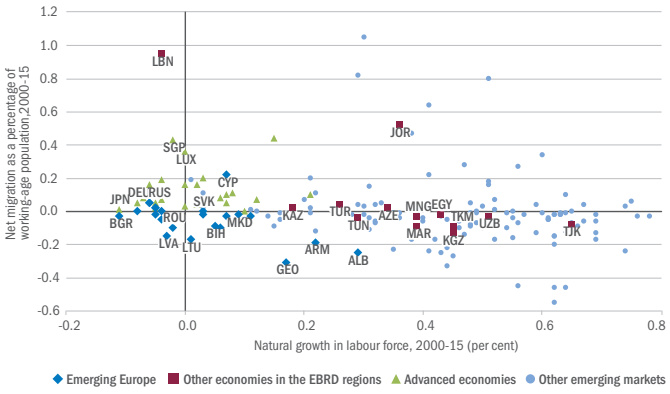
CHART 1.7. The working-age population of emerging Europe is expected to shrink by 17 per cent by 2040



Source: UN and authors' calculations.

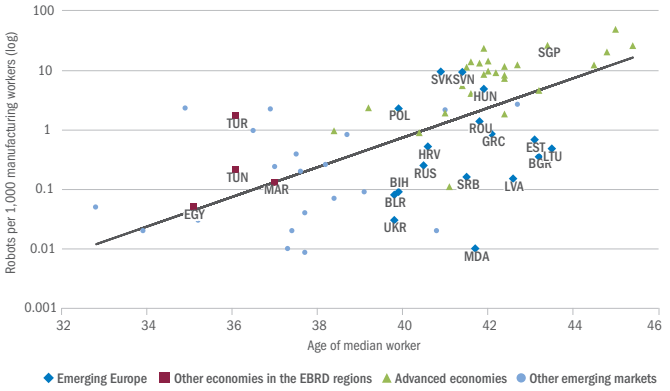
[14] See Billingsley and Duntava (2017).
[15] See Ostner and Schmitt (2008).
[16] See also Adserà (2004) for a discussion of determinants of fertility rates.
[17] World Bank (2015b) provides detailed analysis of the economic implications of ageing in Europe and Central Asia.

CHART 1.8. Changes in working-age population: natural growth versus net migration



Source: UN, World Bank and authors' calculations.
Note: Natural growth in the labour force reflects both demographic trends and changes in labour force participation rates.

CHART 1.9. Robots are used more widely in economies with older workforces



Source: International Federation of Robotics (IFR), ILO and authors' calculations.
Note: Based on data for 2017 or the latest year available.

THE POPULATION-WEIGHTED AVERAGE STATUTORY RETIREMENT AGE IS LESS THAN 60 IN THE EBRD REGIONS, COMPARED WITH MORE THAN 65 IN THE G7

Many advanced economies have experienced significant inflows of working-age migrants that have compensated for weak or negative growth in the native working-age population (see the upper-left quadrant of Chart 1.8). As a result, many high-income countries are continuing to enjoy the first demographic dividend (that is to say, their labour force is still growing faster than the total population). Indeed, the population of the USA remains younger than those of many economies in emerging Europe (see Chart 1.6).

Uniquely, emerging Europe has experienced the opposite, with migration generally exacerbating – rather than mitigating – demographic pressures (see the lower-left quadrant of Chart 1.8). Over the past two decades countries in emerging Europe have seen substantial net outward migration for both highly skilled and low-skilled labour, mostly to advanced EU economies.[18] At the same time, Turkey and Jordan, countries with higher natural growth rates, have experienced a significant influx of refugees.

Emigration does bring economic opportunities, however, if the skills and experiences of returning migrants and diasporas abroad can be harnessed and used to improve domestic productivity, boost innovation and broaden export markets. A section of Chapter 2 looks more closely at the economic impact of emigration in emerging Europe, and Chapters 3 and 4 examine migration patterns in the region in greater detail.

Automation and technological change are stronger where labour is scarce

Advances in automation have enabled labour to be partially replaced with capital where workers are scarce. In Japan, for example, migration policies are restrictive and immigration is low, but there is a high degree of automation. More broadly, recent studies suggest that areas where labour has become more scarce have seen greater use of automation.[19]

With emerging Europe's labour force shrinking and its labour costs rising, incentives to automate jobs may be stronger than in other emerging markets. For instance, the penetration rates of robots in Hungary, Poland, Slovenia and the Slovak Republic are similar to those observed in advanced economies and well above the rates seen in Brazil, China, India and South Africa (see Chart 1.9).

On average, however, countries in the EBRD regions have been automating work processes more slowly than advanced economies with similar demographic profiles. This suggests that there is significant potential for rapid automation in the future, leveraging the regions' relatively high levels of human capital (as confirmed by the analysis in later sections of this chapter). At present, robots are primarily deployed in the automotive, electronics, appliances, chemicals, and machinery and equipment sectors, but they may be used more widely in other sectors in the future.

[18] See Atoyan et al. (2016) for a discussion of this issue and estimates of its economic impact.
[19] See Acemoğlu and Restrepo (2017a; 2018).

Leveraging technological advances may help to reduce upward pressure on wages and raise labour productivity, thereby strengthening economies' competitiveness in spite of demographic headwinds.[20] This may, however, entail greater polarisation of jobs – that is to say, rising numbers of low-skilled and high-skilled jobs, and declining numbers of medium-skilled jobs (see Chapter 2 for a discussion of this issue). Consequently, economic policy needs to respond to the combined impact that demographic shifts and technological change have on income distribution and the nature of jobs.

Demographics, technological change and migration

Throughout history, education, demographic transformation and technological progress have been closely linked.[21] For example, the plague epidemics in Europe in the 14th century suddenly rendered labour much scarcer than land, which pushed up occupational wages. Over time, higher wages encouraged innovation and automation (such as the invention of the printing press in the 15th century). Higher wages also encouraged women to take up employment and led to a significant drop in fertility rates, thereby further reinforcing the relative scarcity of labour.[22]

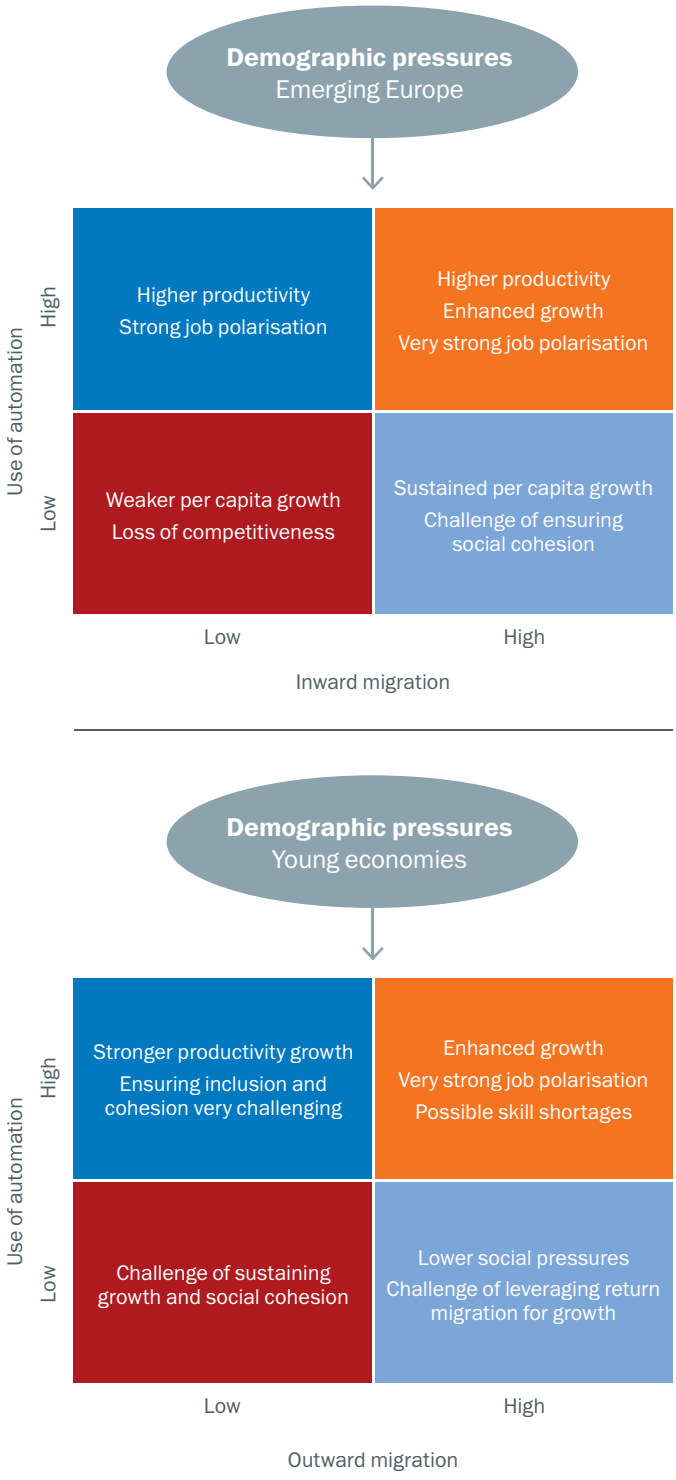
Thus, the economic impact of demographic pressures cannot be analysed in isolation. What matters for economic outcomes is the interplay between demographics and trends in technology and migration, as well as the way in which education and social safety nets respond to those trends. This is true both in rapidly ageing societies and in young economies (see the upper and lower panels of Chart 1.10 respectively). For instance, while an increase in immigration may support growth in an ageing economy, it will pose challenges in terms of inclusion and social cohesion. Increased use of automation can ease labour shortages that arise due to ageing and emigration but may further exacerbate inequality.

In young economies, meanwhile, it may be difficult to create jobs and boost labour productivity in the absence of increases in capital-to-worker ratios (automation) and significant outward migration. There, joblessness among young entrants to the labour market also has the potential to threaten social cohesion. These interactions are explored in greater detail in other parts of this report, with Chapter 2 looking at labour markets, Chapter 3 focusing on migration across borders and Chapter 4 looking at migration within countries. The remainder of this chapter focuses on the lengthening of working lives in ageing economies.

19%

OF PIAAC SURVEY RESPONDENTS IN ECONOMIES WHERE THE EBRD INVESTS WERE RECENTLY GIVEN TRAINING BY THEIR EMPLOYER, COMPARED WITH 30% IN ADVANCED ECONOMIES

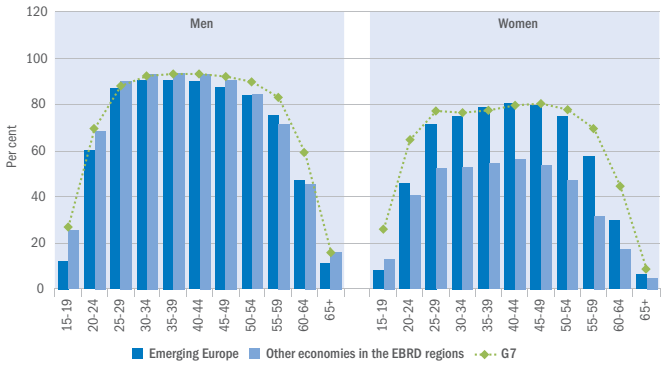
CHART 1.10. Interplay between demographic pressures, migration and automation



Source: EBRD

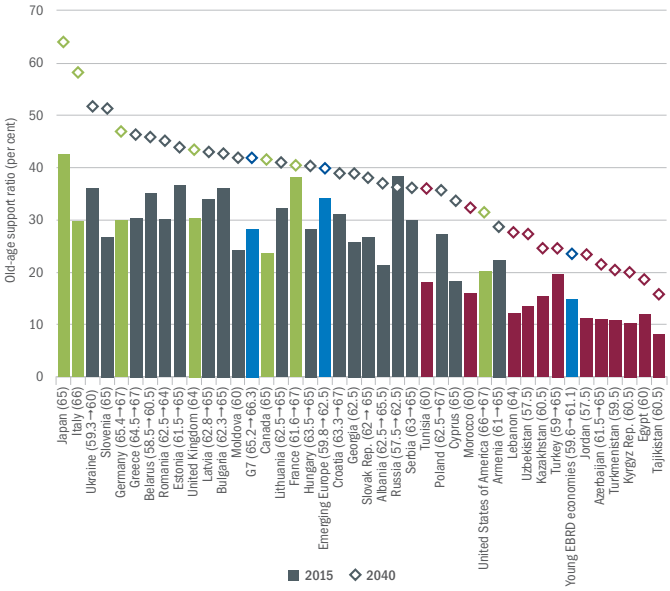
[20] See Acemoğlu and Restrepo (2017b) for empirical evidence.
[21] See Goldin and Katz (2009).
[22] See Voigtländer and Voth (2013).

CHART 1.11. Labour force participation rates decline faster with age in the EBRD regions than they do in G7 economies



Source: ILO and authors' calculations.
Note: Based on data for 2017 or the latest year available.

CHART 1.12. Old-age support ratios are projected to rise significantly between 2015 and 2040



Source: US Social Security Administration, UN and authors' calculations.
Note: The figures in brackets are simple averages of statutory pension ages for men and women, with arrows indicating changes over the period in question. The old-age support ratio is defined as the retirement-age population as a percentage of the working-age population on the basis of the country's statutory retirement age(s). Different colours denote emerging Europe, young economies in the EBRD regions, and the G7.

Rising labour force participation among older people

As advanced economies have aged, labour force participation rates have risen among older people, although participation levels remain far lower than those observed among younger people.[23] Today, labour force participation rates for men in the G7 economies decline from around 90 per cent for men between the ages of 25 and 50 to around 60 per cent for men aged between 60 and 64, and less than 20 per cent for men aged 65 or over (see Chart 1.11).

In the G7 economies, the average labour force participation rate among people aged between 50 and 64 stood at 74 per cent in 2017, up from 68 per cent in 1997. The corresponding rate in the EBRD regions was lower at 60 per cent, although it too had increased since 1997, rising by 4 percentage points.

The EBRD regions and the G7 economies have similar labour force participation rates for prime-age men. However, participation rates for men start declining earlier in the EBRD regions, at around the age of 50, reflecting weaker health of workers and relatively early retirement ages in some countries. Meanwhile, in young economies where the EBRD invests, labour force participation rates among women are significantly lower (across all age groups) than those observed in the G7.

Labour force participation rates are also significantly lower among people below the age of 25 – both men and women – than they are in the G7 economies. In fact, concerns are sometimes raised that higher rates of employment among older people may entail lower employment rates among younger cohorts. The evidence, while inconclusive, tends to suggest the opposite – namely, that higher employment rates among older and younger workers tend to go hand in hand.[24]

The path that ageing economies need to take is clear: in the absence of a major demographic turnaround, older workers will need to work for longer. Policy responses in two areas can help to boost labour force participation among older people. First, pension and tax systems can be adjusted to encourage longer working lives. And second, improvements in healthcare and lifelong learning opportunities can help workers to remain productive and have longer careers. As discussed below, some encouraging developments can be observed in these areas.

Adjusting pension systems in response to ageing populations

Pension systems in the EBRD regions tend to have generous parameters. For instance, the population-weighted average statutory retirement age is less than 60 in the EBRD regions, compared with more than 65 in the G7. What is more, in many cases the retirement age for women is as many as five years lower than that of men. In addition, many pension systems also include numerous options in terms of early retirement and disability pensions.[25]

Retirement ages in the EBRD regions are set to increase by an average of two years over the next two decades, on the basis of legislation that is already in force. However, old-age support ratios (defined as the retirement-age population as a percentage of the working-age population) will continue to rise. By 2040, the average old-age support ratio in emerging Europe is projected to be well above the G7 equivalent, with one retirement-age adult for every two working-age adults (see Chart 1.12).

In these circumstances, pension systems cannot deliver both broad coverage of the population and generous entitlements (high pension-to-wage ratios) while remaining fiscally sustainable. Different countries approach this trilemma in different ways.

[23] See, for instance, Maestas and Zissimopoulos (2010) for a discussion of the links between ageing populations and longer working lives.
[24] See Wise (2010).
[25] The discussion here is based largely on World Bank (2014).

In the EBRD regions, the fiscal burden of public pensions tends to be manageable, with social security systems focusing on providing basic benefits aimed at ensuring that pensioners remain above the poverty line.[26]

As a result, average retirement incomes in the EBRD regions tend to be less generous than those observed in advanced economies (relative to wages). A number of public pension systems include funded (defined contribution) pillars, but the coverage of those second-pillar components remains modest, with relatively low contribution rates. Private pension savings have also remained low as a percentage of countries' GDP, while real (inflation-adjusted) returns on pension assets held by public and private pension funds have been negative in many countries.[27]

Consequently, younger cohorts of workers need to be fully aware of the need to work longer and/or accumulate substantial savings in order to maintain higher levels of income in later life. At present, reforms that seek to improve the sustainability of public pension systems by reducing the generosity of pension entitlements are often strongly opposed by voters.

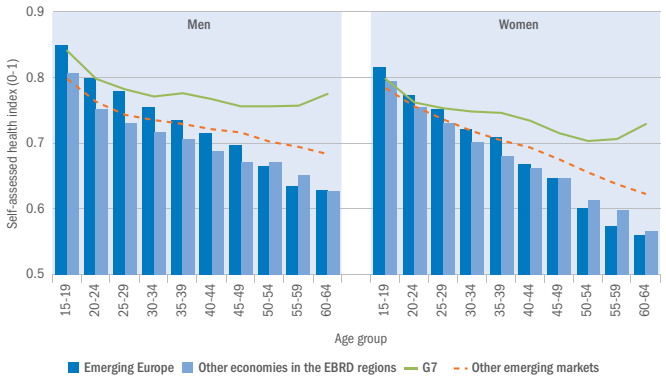
Reforms that raise the retirement age, if successfully implemented, are likely to provide stronger incentives to work longer. Evidence suggests that workers are much more likely to remain in the labour force if the benefits they are eligible to receive on exiting it are lower.[28] In Iceland, for instance, workers who choose to work on beyond the statutory retirement age of 67 (which will rise to 70 in the future) are eligible to receive a larger pension, with their pension entitlement rising by 0.5 percentage point per month for a maximum of five years. Large numbers of eligible workers have taken advantage of this opportunity.

Using taxation to encourage labour force participation

It is often the case that tax and benefit systems strongly discourage older people from taking up employment, particularly when it comes to low-paid jobs, where the difference between take-home pay and any benefits available in the absence of employment may be small. Employer subsidies or individual tax credits for staff over the age of, say, 55 who are employed on certain types of contract could strengthen older workers' incentives to remain in the labour force. Such programmes are costly, but they may represent a fiscally viable alternative to unemployment benefits or early retirement payments.

Another challenge is to limit the impact that rising old-age support ratios have on labour taxes and incentives to substitute capital for labour. Traditionally, both funded pension schemes and unfunded pay-as-you-go schemes have been financed using social security contributions (a form of labour tax). As the labour force dwindles and numbers of retirees rise, ever higher levels of social security contributions may be required in order to fund pension obligations, making labour more expensive from an entrepreneur's perspective and strengthening incentives for automation, offshoring of jobs and tax avoidance.

CHART 1.13. Self-assessed health declines rapidly with age in the EBRD regions



Source: Gallup World Poll and authors' calculations.
Note: "Emerging markets" are defined here as economies with GDP per capita in excess of US$ 1,100 at market exchange rates that are not regarded as advanced economies on the basis of the IMF's definition.

Funding pensions out of consumption and wealth taxes may represent a more robust option, with a broader tax base and a smaller impact on the economy's competitiveness and incentives to substitute capital for labour. However, taxes on consumption tend to be more regressive than income taxes. Equity considerations relating to such reforms need to be addressed using appropriate expenditure policy measures.

Good health and labour force participation

Incentives to seek employment are important, but people's ability to remain productive as they get older may be even more important. This is crucially dependent on two key factors: people's health[29] and their ability to retain and upgrade skills.[30] This section examines these factors in turn.

The role that good health plays in explaining the likelihood of a person being employed or seeking employment can be investigated using data from the Gallup World Poll – an annual household survey covering more than 160 territories around the world (including all economies in the EBRD regions). Each round of the survey involves at least 1,000 respondents in each country, with participants being asked several questions about their physical and mental health. Participants' responses can be aggregated to establish a rescaled composite index ranging from 0 (very poor health) to 1 (good health).

The self-assessed health of male respondents in emerging Europe declines sharply after the age of 50 (see Chart 1.13). This mirrors the decline in labour force participation rates among the same cohorts (see Chart 1.11). In contrast, self-assessed health

[26] See World Bank (2014). The fiscal implications of pension reform are beyond the scope of the analysis in this chapter of the *Transition Report 2018-19*.
[27] See World Bank (2014) for evidence.
[28] See Gruber and Wise (2002).
[29] See, for instance, Kulik et al. (2014).
[30] See Kotschy and Sunde (2018).

tends to decline later in life in other emerging markets and the G7. However, causality may run in both directions, with a number of studies finding that early retirement may lead to a less active lifestyle and a further deterioration in health.[31]

More broadly, deteriorating health is strongly linked to people's decisions not to seek employment.[32] Looking at Gallup World Poll data for all countries with GDP per capita in excess of US$ 1,100 at market exchange rates, around 22 per cent of respondents between the ages of 30 and 65 stay out of the labour force. The regression analysis reported in Table 1.1 looks at determinants of the likelihood of labour force participation across various countries, taking account of several different factors (such as gender, age, being in full-time education or training, and living in a particular country in a given year). Self-reported health is a major determinant of the decision not to seek employment, even when all of those other factors are taken into account. Health has a stronger impact on labour force participation among people between the ages of 50 and 65.

In emerging Europe, the impact of poor health is particularly strong among people over the age of 50 (see columns 1 and 3 of Table 1.1). If self-reported health improves from the 25th to the 75th percentile of the distribution of answers (corresponding to an increase of 0.4 on the 0-1 scale), that is associated with an increase of approximately 7 percentage points in the likelihood of seeking employment for respondents in emerging Europe between the ages of 50 and 65.[33]

A similar relationship can be observed in data collected by the Organisation for Economic Co-operation and Development (OECD) as part of its Programme for the International Assessment of Adult Competencies (PIAAC). Those PIAAC data, which are discussed in greater detail below and focus on skills and education, identify individuals who are in employment, education or training. Survey

TABLE 1.1. Good health is associated with an increased likelihood of labour force participation

Dependent variable	In the labour force/ in employment, education or training			
Interaction by region:				
Regional grouping	All EBRD	Young economies	Emerging Europe	
Sample	Gallup	Gallup	Gallup	PIAAC
	(1)	(2)	(3)	(4)
Health index (0-1)	0.027*** (0.003)	0.038*** (0.003)	0.017*** (0.003)	0.210*** (-0.011)
Female	-0.230*** (0.004)	-0.203*** (0.004)	-0.263*** (0.004)	-0.136*** (-0.012)
Age 50-65	-0.060*** (0.005)	-0.088*** (0.005)	-0.073*** (0.005)	-0.132*** (0.0139)
Health index * Female	-0.009* (0.005)	-0.018*** (0.005)	0.003 (0.005)	0.053*** (-0.016)
Health index * Age 50-65	0.038*** (0.007)	0.064*** (0.005)	0.046*** (0.006)	0.217*** (0.0182)
Female * Age 50-65	0.009 (0.007)	0.010 (0.006)	0.019*** (0.006)	0.020 (-0.019)
Health index * Age 50-65 * Female	0.022** (0.009)	0.016* (0.008)	0.021** (0.008)	0.026 (-0.026)
Health index * Region	0.005 (0.007)	-0.038*** (0.008)	0.070*** (0.009)	0.108*** (-0.029)
Female * Region	-0.0175* (0.008)	-0.210*** (0.01)	0.178*** (0.01)	0.161*** (-0.03)
Health index * Female * Region	0.009 (0.01)	0.03** (0.013)	-0.056*** (0.012)	-0.235*** (-0.04)
Age 50-65 * Region	-0.104*** (0.009)	-0.048*** (0.013)	-0.048*** (0.012)	-0.166*** (-0.031)
Health index * Age 50-65 * Region	0.075*** (0.012)	0.023 (0.017)	0.036** (0.014)	0.198*** (-0.046)
Female * Age 50-65 * Region	0.042*** (0.012)	0.054** (0.016)	-0.057*** (0.014)	-0.033 (-0.042)
Health index * Female * Age 50 -65 * Region	-0.025 (0.016)	-0.008 (0.023)	0.020 (0.019)	-0.044 (-0.063)
Number of observations	215,413	85,388	130,025	104,312
R^2	0.163	0.166	0.165	0.199

Source: Gallup World Poll, PIAAC and authors' calculations.
Note: Estimated using a linear probability model controlling for country effects, year effects, respondent's year of birth, level of education, town size and other relevant characteristics. Probit estimations (not reported) yield similar results. The Gallup sample comprises individuals between the ages of 30 and 65 in economies with GDP per capita in excess of US$ 1,100 at market exchange rates. Robust standard errors are reported in parentheses, and *, ** and *** denote values that are statistically significant at the 10, 5 and 1 per cent levels respectively.

[31] See, for instance, Behncke (2012) and Mazzonna and Peracchi (2012).
[32] See Autor and Duggan (2003) for evidence from the USA.
[33] This figure, which is based on the results reported in Table 1.1, has been calculated by adding together the regression coefficients for (i) self-reported health, (ii) the interaction term between self-reported health and the dummy variable for the EBRD regions, (iii) the interaction term between self-reported health and the dummy variable for individuals aged 50 to 65, and (iv) the triple interaction term involving both dummy variables.

respondents are also asked to assess their health using a five-point scale. In the interests of comparability with Gallup data, those responses have been rescaled such that they range from 0 to 1. As with the Gallup data, good health is strongly associated with an increased likelihood of being in employment, education or training (see column 4 of Table 1.1).

The strong relationship between good health and an increased likelihood of labour force participation among people aged 50 or over calls for improvements in healthcare in the EBRD regions. It also highlights the need to make workplaces more suitable for ageing workers. Pilot projects at a BMW plant in Dingolfing (Germany) and a Renault plant in Novo Mesto (Slovenia) confirm that relatively inexpensive changes to equipment, uniforms and factory floors at manufacturing facilities (such as the introduction of softer floors, orthopaedic footwear, ergonomic chairs, vertically adjustable tables and magnifying lenses for work involving small parts)[34] can significantly improve workers' health and reduce sick leave among older employees. The potential to reduce rates of absenteeism and improve productivity among older workers mean that such investment is worthwhile for the companies in question.

Retaining and updating skills in the face of ageing

Lifelong learning can help to support longer working lives

Looking beyond the issue of health, low labour force participation rates among older age groups may also, to a large extent, reflect the difficulty of acquiring, retaining and updating skills. Older workers tend to find it harder to keep up with technological changes and generally have greater difficulty finding new employment.[35] In the past, workers could often rely on existing skills for the duration of their careers, but that is not necessarily the case these days, with working lives becoming longer and technology changing rapidly.

Studies suggest that learning new skills requires more effort the older you become, reflecting the declining adaptability of the brain. Consequently, it may be that acquiring new technical skills (such as the ability to speak a foreign language or develop software) ceases to be worthwhile once workers reach their early thirties[36] – well below the age of the median worker. What is more, by 2030 the median worker is projected to be in their early forties in the EBRD regions (and as old as 46 in Bulgaria).

The cost-benefit profile of acquiring new skills after the age of 40 can be improved if the cost of mid-career learning can be lowered. For example, changes could be made to basic educational qualifications (including university degrees) in order to help individuals to learn how to keep learning, rather than trying to provide students with specific skills that will remain relevant for decades. Indeed, research suggests that around half of all acquired skills now lose their relevance within five years in the absence of retraining.[37] Workplace practices and professional training may also have an important role to play when it comes to retaining and updating skills.

PIAAC surveys: an indicator of adult skills

We can gain deeper insight into the skills of workers at different stages in their lives by looking at the results of the OECD's PIAAC surveys measuring the skills of adults aged 16 to 65. Those surveys were conducted between 2011 and 2014 in 31 countries, including nine economies in the EBRD regions: six post-communist countries (Estonia, Lithuania, Poland, Russia, the Slovak Republic and Slovenia), plus Cyprus, Greece and Turkey. The Czech Republic – another post-communist country – also participated in the surveys, which included questions about people's backgrounds, education, employment and well-being, as well as assessments of literacy, numeracy and problem-solving skills. Most participating countries outside the EBRD regions were high-income economies.

The average skill levels observed across all age groups in the PIAAC data are strongly correlated with the country-level measures of human capital (based on average years of education) that were used in growth accounting in earlier Transition Reports. At an individual level, a better performance in PIAAC tests is associated with better socio-economic outcomes: an increased likelihood of being employed, higher wages and greater job satisfaction. The analysis below looks at these links in more detail.

Assessed skills decline after the age of 30: ageing and cohort effects

As Chart 1.14 indicates, countries in the EBRD regions tend, on average, to perform relatively well in PIAAC tests, particularly in relation to their levels of per capita income. In this analysis, literacy scores taken from PIAAC data have been complemented with comparable literacy scores derived from the World Bank's STEP skills measurement programme, which was carried out between 2012 and 2017 and covered a number of developing and emerging market economies.[38]

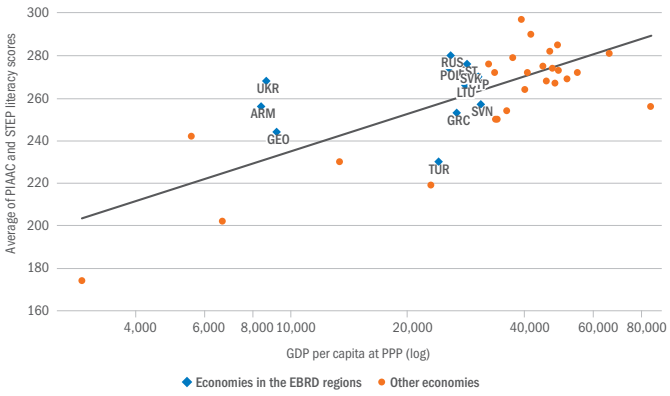
However, as in advanced economies, average performance in the EBRD regions tends to be weaker among older survey participants (see Chart 1.15). Across economies, scores initially improve as survey participants gain extra years of education and training, before declining from around the age of 30 onwards. This decline in performance among older workers is broadbased, with the dispersion of scores remaining broadly stable across the various age groups.

The downward trend seen after the age of 30 reflects a combination of two factors: first, the impact that the ageing process has on basic skills; and second, cohort effects (that is to say, the fact that older respondents were educated at an earlier point in time, when education enrolment rates may have been lower and different curricula were in place). In other words, older workers may need to update and broaden their skills – rather than simply retaining them – in line with changes in technology and working practices.

Studies suggest that such cohort effects may have a large impact.[39] Indeed, with younger people tending to be more familiar with computers and information technology (IT), it is noticeable that, across countries, average problem-solving scores (which involve a computer-administered test) decline faster with age

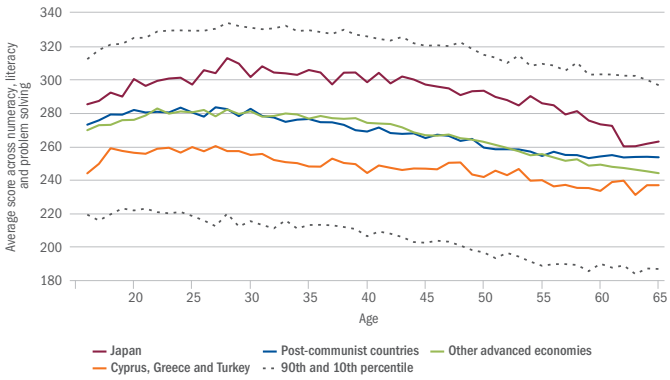
[34] See Loch et al. (2010).
[35] See Ahituv and Zeira (2011).
[36] See World Bank (2018).
[37] See Deloitte (2017).
[38] See Pierre et al. (2014) for a description of that programme.
[39] See Skirbekk et al. (2013).

CHART 1.14. Emerging Europe performs well in PIAAC and STEP tests relative to those countries' per capita income levels



Source: IMF, PIAAC, STEP and authors' calculations.
Note: PIAAC surveys were conducted between 2011 and 2014; STEP surveys were conducted between 2012 and 2017.

CHART 1.15. Average PIAAC scores decline with age, but trends differ across regions



Source: PIAAC and authors' calculations.

IN THE EBRD REGIONS, BEING OVERQUALIFIED LOWERS JOB SATISFACTION BY AN AVERAGE OF AROUND 25% OF A STANDARD DEVIATION

than literacy and numeracy scores (which are based on a pencil-and-paper assessment).

As the PIAAC surveys have only been conducted once, it is not possible to distinguish between the impact of ageing and cohort effects. Nonetheless, this analysis remains informative. Measures that enhance mid-career learning can help people not only to retain skills in the face of ageing, but also to update them (thereby reducing the differences between the various cohorts).

Age-skill profiles differ across countries

Japan, the world's fastest-ageing economy (see Chart 1.6), also boasts the highest skill levels among older age groups, as reflected in average PIAAC scores (see Chart 1.15). However, even in Japan people aged 53 and over average weaker scores than 16-year-olds. This raises the question of how rapidly ageing economies in the EBRD regions and other parts of the world can increase the skill levels of older workers.

Determinants of the skill levels of older employees

In order to shed light on this question, one can look at the determinants of skill levels across different age groups. The dependent variable in this analysis is the average test score across numeracy, literacy and problem solving. All specifications seeking to explain variation in test scores include interaction terms combining relevant factors (such as participation in training programmes) and the dummy variables for each 10-year age group. This results in separate estimates of the impact that, say, actively using skills at work has on people aged 16 to 24, people aged 25 to 34, and so on.

As one would expect, having a tertiary (university) degree is associated with higher average skills across all age groups when compared with respondents who have only completed secondary education (see Chart 1.16), which represent the baseline group in this analysis. Indeed, for 57 per cent of respondents in the EBRD regions, the completion of secondary education represents their highest academic qualification (with a similar percentage being observed in comparator countries), while one in five survey participants in the EBRD regions hold a tertiary degree. Having a research degree such as a PhD (held by 0.5 per cent of respondents in the EBRD regions) is associated with an additional increase in test scores.

A large positive effect in terms of the retention of skills appears to come from the frequent use of skills at work. Survey participants were asked how frequently they had to use problem-solving, numeracy and literacy skills in the workplace, with answers ranging from "never" to "every day". Those answers have been aggregated to form an index measuring the use of skills at work, which ranges from 0 (skills never used) to 19 (frequent use of all skills referred to in the survey). If the use of skills increases from the 25th to the 90th percentile of the distribution of this index, that is associated with an increase in test scores of up to half a standard deviation. The impact of this is particularly large for people aged 35 and over (see Chart 1.16).

Employee and employer training is also associated with higher levels of skill throughout a person's working life. A training index

constructed for the purposes of this analysis takes account of recent training organised by employers. Only 19 per cent of respondents in the EBRD regions reported having undertaken such training, compared with 30 per cent in other economies covered by the PIAAC tests. The index also covers private tuition (such as language classes) that has been undertaken by the respondent in the last 12 months – and again, the participation rate in the EBRD regions (14 per cent) is lower than that observed in comparator countries (18 per cent). The last component of the training index is the extent of the respondent's willingness to learn, as reported by respondents themselves using a four-point scale. The overall index ranges from 0 to 10, and an increase in a person's training score from the 25th to the 90th percentile of the distribution is associated with an increase in skill assessment scores of up to 17 per cent of a standard deviation.

Overall, these results reinforce the view that providing mid-career training can help employees to retain and upgrade their skills. Technological advances are opening up new avenues in terms of the provision of such training (as in the case of distance-learning programmes, for example). Government-backed loan initiatives with income-contingent repayment over the longer term can help to make degree courses and mid-career training programmes more affordable and attractive. And packages given to employees in the event of redundancy can include ring-fenced retraining allowances (as in the case of the restructuring of Slovak Telekom, for instance). Moreover, transparent evaluation and rating systems can help to improve the quality and relevance of training.

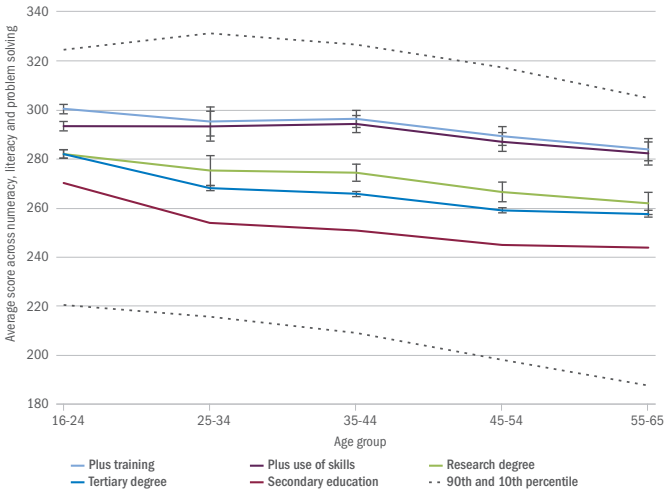
In addition, greater use of teams with a variety of different ages can facilitate on-the-job learning, as the skills and experiences of younger and older employees tend to be complementary.[40] Moreover, increased rotation across tasks can enable employees to use and upgrade their skills at work, while in some cases also reducing the physical and mental strain associated with repetitive actions.[41]

Skills mismatches can lead to overqualification and low job satisfaction

When it comes to the impact that degrees have on skills, the quality of degrees – although not observed in the data – matters. Importantly, the above estimates of the relationship between degrees and skills represent an upper-bound estimate of the impact of those qualifications, as that analysis cannot meaningfully account for the fact that it tends to be students with stronger initial skills who are accepted into tertiary education (with the same being true of the use of skills at work and participation in training).

If degrees do not help to develop skills demanded by the market, a policy aimed at increasing the percentage of the population who have tertiary qualifications may lead to individuals becoming overqualified for the jobs they are doing. This, in turn, may have a strong negative impact on job satisfaction – and, ultimately, people's well-being.

CHART 1.16. Estimated skills by age group depending on education, on-the-job training and use of skills at work



Source: PIAAC and authors' calculations.
Note: These estimates are based on the regression of average skills on interaction terms between various factors and the five age groups. Specifications include country and industry effects, age (with a separate coefficient estimated for people over the age of 30), gender, immigration status, native language, type and size of employer, parents' education and other relevant characteristics. Ninety-five per cent confidence intervals are shown for the corresponding estimates of marginal effects.

TABLE 1.2. Overqualification is associated with lower job satisfaction

Dependent variable	Job satisfaction		
Method	(1) OLS	(2) IV	(3) IV
Overqualification	-0.164*** (0.006)	-0.160*** (0.007)	-0.144*** (0.007)
Average skill score	-0.0001 (0.004)	0.046** (0.022)	0.047* (0.022)
Education below secondary level	0.001 (0.009)	0.030* (0.016)	0.031* (0.016)
Tertiary education	-0.003 (0.007)	-0.023* (0.012)	-0.022* (0.012)
Research degree	0.125*** (0.026)	0.093*** (0.030)	0.094*** (0.030)
Overqualification * EBRD regions			-0.070*** (0.015)
Number of observations	86,823	86,359	86,359
R^2	0.087	0.085	0.085

Source: PIAAC and authors' calculations.
Note: Estimated using ordinary least squares (OLS) and instrumented variables (IV), controlling for country and industry effects, age (with separate coefficients estimated for people aged 16-30 and people aged 31-65), gender, immigration status, native language, type and size of employer, parents' education and other relevant characteristics. Average skills are instrumented with the number of books at home at the age of 16. Robust standard errors are reported in parentheses, and *, ** and *** denote values that are statistically significant at the 10, 5 and 1 per cent levels respectively.

[40] See, for instance, Gobel and Zwick (2012) and Naegele and Walker (2006).
[41] See Loch et al. (2010).

The PIAAC survey provides an opportunity to relate a measure of overqualification to job satisfaction. Each respondent was asked to name the qualification that a successful applicant for his/her job would be expected to hold at present. This qualification can be compared with the respondent's level of education, with survey participants who are educated to a higher standard than their job would normally require being deemed to be overqualified. Inevitably, this measure of overqualification involves a subjective element – the respondent's opinion about the qualification that is needed to do his/her own job.

Around a third of respondents in the EBRD regions were deemed to be overqualified (with the same percentage being observed in comparator countries). Younger people (those aged between 16 and 24) were more likely to be overqualified (with 42 per cent of them falling into that category). Incidence of overqualification was also above average among university graduates (37 per cent), rising to 51 per cent for holders of research degrees.

Participants also reported their level of job satisfaction on a five-point scale ranging from 0 (extremely dissatisfied) to 4 (extremely satisfied). Overall, 80 per cent of respondents in advanced economies were satisfied or extremely satisfied with their jobs, compared with 75 per cent in the EBRD regions.

Overqualification is one of the key causes of low job satisfaction, even after the level of education and performance in PIAAC tests have been taken into account alongside other factors such as the respondent's country, industry, gender, age and type of employment (see Table 1.2). The negative relationship between overqualification and job satisfaction is even stronger in the EBRD regions, where being overqualified lowers job satisfaction by about 25 per cent of a standard deviation (see column 3). In contrast, having a higher skill score and having a research degree are both associated with a higher level of job satisfaction.

The strongly negative relationship between overqualification and job satisfaction reinforces the need to focus on the quality of degrees. In this regard, greater private-sector participation in the design of educational and retraining programmes and the drawing-up of their curricula can help to reduce skills mismatches in the labour market.

Reforms of the 1990s improved the retention of skills

However, the content of degrees is hard to observe, and country-wide changes in the quality (as opposed to the quantity) of education are notoriously difficult to measure. The transition from central planning to market-based systems in post-communist countries in the early 1990s offers a rare opportunity to look at the impact that market reforms have on the acquisition and retention of skills.

Educational reforms in these countries – which included changes to curricula, teacher training and student assessment – were phased in gradually over many years and at differing speeds. Certain changes were made quickly, including increases in foreign language tuition, the introduction of computers and the removal of ideological subjects. In addition, in many countries people graduating before those early transition reforms were assigned to their future employers by central authorities, whereas people graduating after those reforms had to look for a job themselves and were free to choose their employers.

Do the current skills of people educated before those early transition reforms systematically differ from the skills of people educated after the start of the transition process? PIAAC data can shed light on this question. For every individual, survey records include the total years of education and the year when the highest qualification was obtained. And for every country, the timing of early transition reforms can be determined on the basis of the year in which the prices of most goods and services were liberalised[42] – information that can be derived from the EBRD's transition indicators. So, for everyone in the seven post-communist countries covered by the PIAAC surveys, the average assessment score can be related both to the person's level of education and to the number of years of post-reform education. As before, this analysis also considers other relevant characteristics, including the respondent's gender, age and country of residence.

This analysis shows that people who undertook some or all of their years of education after the start of those transition reforms performed better in PIAAC tests (see Table 1.3). As expected, each extra year of post-reform education makes a positive and statistically significant contribution to the test score (of around 0.4 per cent of a standard deviation), adding up to a total increase of around 7 per cent of a standard deviation for a university graduate educated entirely after the reforms relative

46
YEARS
PROJECTED AGE OF THE MEDIAN WORKER IN BULGARIA IN 2030

75%
OF PIAAC SURVEY RESPONDENTS IN THE EBRD REGIONS ARE SATISFIED WITH THEIR JOB

[42] See Guriev and Zhuravskaya (2009) and Adserà et al. (2018).

to a university graduate educated entirely before the start of the reforms. Similar results can be observed if one looks at the number of years in education completed since the start of those reforms as a percentage of the total number of years of education.

This analysis is able to take account of participants' ages, as the total years of education vary across individuals, while the start dates of reforms vary across countries, implying that participants of the same age had varying exposure to post-reform education. However, most participants who undertook some or all of their years of education after the start of reforms are younger than those educated before the reforms, which gives rise to a concern that the results may primarily reflect cohort effects – that is to say, the continuous improvement in education enrolment rates and the quality of education in the 1990s and 2000s.

To alleviate such concerns, a placebo test repeated this exercise for the other countries in the PIAAC sample, which did not experience a transition from central planning to market-based systems. In this group of non-post-communist economies, start dates for fictitious price liberalisation reforms (ranging from 1990 to 1995) were assigned to countries on the basis of alphabetical order. Similar calculations were then used to determine the number of years of education that each individual had undertaken following those pseudo-reforms.

Reassuringly, the effect of those pseudo-reforms in non-post-communist countries is very small (and, if anything, negative), notwithstanding the fact that those countries are subject to the same potential cohort effects as post-communist countries.

TABLE 1.3. In post-communist countries, people who undertook some or all of their years of education after the start of transition reforms achieve higher scores in PIAAC tests

Dependent variable	Average test score (z-score)	
Sample	(1) Post-communist countries	(2) Other countries placebo test
Years in education after the start of transition	0.004*** (0.001)	
Years in education after the start of transition (placebo)		-0.001 (0.001)
Age	-0.009*** (0.001)	-0.012*** (0.0002)
Female	-0.044*** (0.009)	-0.121*** (0.005)
Education below secondary level	-0.349*** (0.015)	-0.527*** (0.007)
Tertiary education	0.311*** (0.012)	0.390*** (0.006)
Research degree	0.417*** (0.042)	0.618*** (0.027)
Number of observations	33,765	119,346
R^2	0.287	0.458

Source: PIAAC and authors' calculations.
Note: Estimated using OLS, controlling for country and industry effects, immigration status, native language, type and size of employer, parents' education and other relevant characteristics. Robust standard errors are reported in parentheses, and *, ** and *** denote values that are statistically significant at the 10, 5 and 1 per cent levels respectively. In the placebo test, start dates for pseudo-transition reforms were assigned to non-post-communist countries on the basis of alphabetical order.

Improvements in skills after Estonia's education reforms

Estonia's comprehensive education reforms provide an opportunity for a more precise estimation of the effect of such reforms on adult skills. Within the EBRD regions, Estonia is the top performer in international assessments of the performance of 16-year-old students (based on the OECD's Programme for International Student Assessment [PISA]) and one of the top performers in PIAAC assessments of adult skills.

In the early 1990s Estonia embarked on a comprehensive reform of its education system, moving towards the model employed in Finland. Those reforms, which spanned secondary and higher education and were rolled out over the period 1992-98, involved changes to curricula, student assessment and the retraining of teachers. Faster and more comprehensive reforms were carried out in Estonian-speaking schools, with a reform plan for Russian-speaking schools not being put forward until much later, in 1998. A plan to provide all education in Estonian was approved in late 2007.[43]

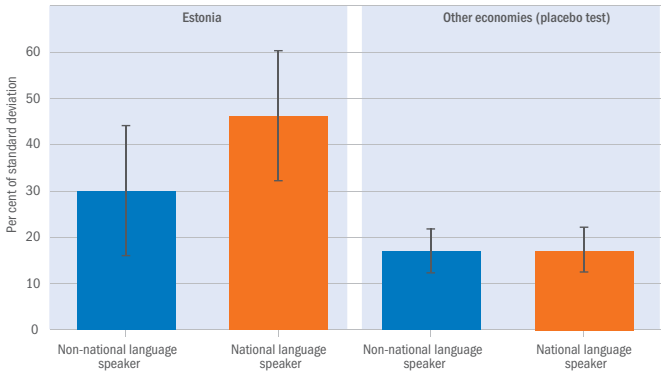
The situation in Estonia provides an opportunity not only to compare the performance of people who began studying after the implementation of those reforms with that of people who graduated before 1992, but also to look at differences between Estonian speakers (who were more exposed to reforms) and the Russian-speaking population in terms of improvements in test scores. Approximately 800 Estonians participated in the PIAAC assessment, 27 per cent of whom were Russian speakers. Of those educated after 1998, around 17 per cent identified themselves as Russian speakers. People who were partially educated during the reform period were excluded from this analysis.

Difference-in-difference regressions show that improvements in test scores following the implementation of reforms were indeed significantly larger among Estonian speakers, with the difference between Estonian speakers and non-Estonian speakers totalling 20 per cent of a standard deviation of test scores (see Chart 1.17). That difference is statistically significant at the 5 per cent level and can be attributed to the effect of Estonia's education reforms in the 1990s.

A concern remains, however, that these results may reflect national language speakers' inherently superior ability to improve their skills relative to speakers of other languages. For example, taking a PIAAC test in one's native language is associated with a statistically significant improvement in test scores. In order to see if this could be the key driver of improvements in test scores over time, this exercise has been repeated for other countries, comparing differences between the scores of national language speakers educated before 1992 and after 1998 with the corresponding differences for non-national language speakers. Unlike in Estonia, the differential for other countries is very small and not significantly different from zero in the statistical sense (see Chart 1.17).

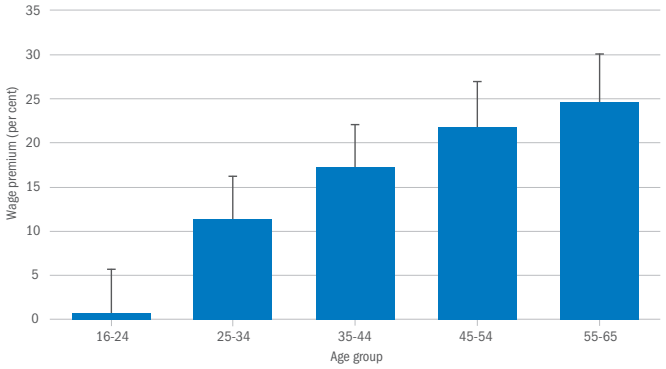
[43] See Lees (2016).

CHART 1.17. Improvement in test scores associated with being educated after – rather than before – education reforms



Source: PIAAC and authors' calculations.
Note: These estimates are based on difference-in-difference regressions of average skills on (i) a dummy variable for individuals educated after the reforms and (ii) an interaction term between that dummy variable and one for individuals speaking the national language. All specifications take account of gender, level of education, immigration status, native language, parents' education, the number of books at home at the age of 16 and other relevant characteristics. 95 per cent confidence intervals are shown for the estimates of marginal effects corresponding to the top portion of each bar.

CHART 1.18. The wage premium associated with a 1 standard deviation increase in average test scores is larger for older workers



Source: PIAAC and authors' calculations.
Note: These estimates are based on regressions of the log of monthly wages on interaction terms between average test scores and the five age groups. Specifications include country and industry effects, age, gender, level of education, immigration status, native language, type and size of employer, parents' education and other relevant characteristics. Average skills are instrumented with the number of books at home at the age of 16. 95 per cent confidence intervals are shown for the corresponding estimates of marginal effects.

Returns to skills are higher among older workers

So far, this analysis has focused on the accumulation and retention of skills during a person's lifetime, as well as the links between education, skills and job satisfaction. But does investment in numeracy, literacy and problem-solving skills actually pay off? The data suggest that financial returns to improvements in skills are sizeable.

While skill scores are lower among older workers, the wage premium associated with improved skills increases with age. People's abilities tend to change in the course of their lifetime, with a shift from learning skills to utilising acquired knowledge in decision-making. Through on-the-job learning, people may acquire various "soft" skills (such as the ability to understand the emotions and motivations of others, negotiate, pitch a product or manage a team), as well as occupation-specific skills. These are distinct from the skills that are assessed in numeracy or literacy tests. And yet, test scores and broader skill sets are likely to exhibit a strongly positive statistical relationship, not least because basic skills such as literacy and numeracy help with the development of other role-specific skills.

In other words, the skills that are assessed in PIAAC tests may act as a useful – albeit imprecise – measure of the broader skill sets accumulated by adults. To account for this possibility in the regression analysis, the average PIAAC test score is instrumented with the number of books the respondent had at home at the age of 16. The number of books at home is a strong predictor of an individual's taste for learning and ability to acquire skills, but it should not directly influence an individual's wage or other labour market outcomes, nor can it be influenced by them. Within the EBRD regions, the percentage of respondents who had at least 100 books at home at the age of 16 ranges from 2 per cent in Turkey to 34 per cent in Estonia.

Regressing the log of monthly wages on test scores and several other explanatory variables suggests that the wage premium associated with higher levels of skill is larger for older employees. The difference in wages that is associated with a 1 standard deviation increase in test scores rises from a few per cent for people under the age of 25 to 25 per cent for people aged between 55 and 65 (see Chart 1.18). Returns to skills for that oldest age group are more than twice the size of those observed for people between the ages of 25 and 34, and that differential is statistically significant at the 5 per cent level. While it may be harder to retain and update skills later in life, the financial returns may well compensate for the effort.

The age profile of skill premia also highlights the way in which population ageing may exacerbate income and wealth inequality. People in occupations where lifelong learning and development are the norm benefit from increasing returns on acquired human capital, whereas people in basic occupations with few such opportunities (as is the case, for example, with many jobs in hospitality or construction) may see their incomes stagnate or decline. As working lives become longer, those pay differentials between occupations may increase accordingly.[44]

Consequently, improvements in lifelong learning opportunities may go a long way towards mitigating income inequality. However, if access to education and entry-level jobs is deeply unequal, such improvements may actually exacerbate inequality instead.[45]

[44] See Blundell (2014).
[45] See EBRD (2016).

Conclusion

Demographic change can occur fast. As countries develop, declining birth rates and increases in life expectancy deliver demographic dividends in the form of a larger number of workers relative to the overall population size, higher levels of savings and enhanced human capital. However, ageing populations and below-replacement birth rates can quickly turn demographic dividends into headwinds. At this point, demographics start to have a negative impact on per capita income growth.

Azerbaijan, Turkey and the economies of the SEMED region and Central Asia are currently at a relatively early stage of that demographic transformation process. Those economies face the challenge of creating large numbers of jobs every year for their new entrants to the labour market, a challenge that is shared by many other developing economies and emerging markets around the world. Priorities in these "young" economies include boosting the amount of physical capital per worker, improving human capital and raising labour force participation among women. Improvements to the business climate and stronger macroeconomic policy frameworks can help these economies to leverage the pool of global savings in order to fund investment in machinery, equipment and education.

In contrast, the economies of emerging Europe find themselves wrestling with population ageing. Ageing in emerging markets – a relatively new phenomenon – is a reflection of economic development that has brought about higher levels of income and improvements in healthcare. But it also represents a major challenge in the sense that demographics are no longer contributing positively to economic growth or per capita income growth.

As in advanced economies – where higher rates of immigration, greater reliance on automation and longer working lives have so far succeeded in mitigating the economic impact of ageing – the future of employment and growth in emerging markets will be shaped by the interplay between trends in demographics, migration and automation, as well as the way in which education and social safety nets respond to those trends.

In emerging Europe, labour force participation rates among older age groups have remained relatively low. Pension reforms raising statutory retirement ages and modifying provisions for early retirement can encourage older people to seek employment and encourage firms to hire older workers, as can changes to tax systems. At the same time, improvements in healthcare, working conditions and lifelong learning opportunities are also needed in order to help older employees to remain productive and retain and upgrade their skills. Extending the country coverage of surveys such as the PIAAC and STEP can help governments to assess skill patterns across the population and design policies to address any gaps.

Chapters 2 and 3 look at the economic impact of automation and cross-border migration in the EBRD regions, while Chapter 4 takes a more detailed look at internal migration and the effect that demographic changes can have on countries' productivity and welfare.

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